REMARKS/ARGUMENTS

In response to the Office Action mailed November 2, 2007, Applicants amend their application and request reconsideration. In this Amendment no claims are newly cancelled and new claims 8-10 are added so that claims 1 and 5-10 are now pending.

A number of claim changes are made in the foregoing Amendment, principally for clarity. Previously, claim 1 referred to "light receiving elements for light amount monitoring" in a generic way and subsequently referred to first and second such light receiving elements. This language may have been somewhat confusing with respect to the final paragraph of claim 1. To avoid that potential confusion, the claim is edited to refer to first and second light receiving elements for light amount monitoring.

It is apparent in studying the patent application that these light receiving elements for light amount monitoring are different from the light receiving elements that are provided for rotation angle detection. With respect to the described embodiments, the light receiving elements for rotation angle detection are designated with a reference number 22 followed by a letter suffix and the light receiving elements for light amount monitoring are identified with a reference number 23 with suffixes to indicate different such elements. In view of these and other clarifications, new claim 8 is added.

The final paragraph of claim 1 is also amended to make clear that the reduced variations in signals from the light receiving elements for light amount monitoring are variations that are caused by two kinds of deviations from the idealized rotary encoder structure. The first of those deviations relates to light intensity distribution deviations and the second refers to assembly errors or tolerances with respect to lack of exact coaxial relationship between the rotary slit plate and the two kinds of light receiving elements.

All examined claims were rejected as anticipated by Yamamoto et al. (U.S. Patent 6,713,756, hereinafter Yamamoto). This rejection is respectfully traversed.

Independent claim 1 is the sole pending independent claim. The optical rotary encoder described in that claim is not described nor suggested by Yamamoto. Yamamoto describes optical encoders in which the light receiving area pitch, p20, see Figures 59A and 63 of Yamamoto, of the photodetector is equal to a diffraction lattice, i.e., diffraction scale, pitch p2, see Figures 35-37, 55C, and 57A-58C of Yamamoto, on the light receiving surface of the photodetector. Attention is particularly directed to the passage of Yamamoto from column 5, line 65 through column 6, line 2 pertaining to Figure 63. However, there is no description in Yamamoto concerning the relationship between angular width of the light receiving area and diffraction lattice pitch on the light receiving surface. For example, in the photodetector of Yamamoto, shown in its Figure 14, four light receiving elements are located within the diffraction lattice pitch p2 on the light receiving surface. In that arrangement, unlike the structure described in claim 1, the angular width of each light receiving element of the photodetector cannot be an integer multiple of a diffraction lattice pitch on the light receiving surface.

Likewise, in other optical encoder embodiments described by Yamamoto, for example, as shown in Figures 23, 35-37, 57A, 57B, 59A, 59B, and 63, the relationship between the light receiving area pitch and the diffraction lattice pitch cannot be as described in the present application and claim 1. In illustrated structures of Yamamoto, the light receiving area pitch p20 is less than or, potentially, equal to the diffraction lattice pitch p2. That relation ensures that the angular width of the light receiving area cannot be an integer multiple of the diffraction lattice pitch p2. In the event the light receiving area pitch p20 might be equal to the diffraction lattice pitch p2 on the light receiving surface of the photodetector, then the angular width of the light receiving elements must be smaller than p2 because the pitch of the light receiving elements is always less than the angular width of the light receiving elements. Stated another way, if there were equality between these values, then all of the light receiving elements would be united as a single element, rather than being separated, and the result, including performance, would be undesirable.

In summary, Yamamoto cannot anticipate claim 1 because at least the feature of the present invention relating the angular widths of the first and second light receiving elements for light amount monitoring to the angular interval of light intensity distribution on surfaces of the first and second light receiving elements for light monitoring is not present in Yamamoto and cannot be suggested by Yamamoto.

Independent of the distinctions between Yamamoto and claim 1, claim 5 further distinguishes from Yamamoto. Among other features, an optical rotary encoder according to claim 5 includes first and second ends of first and second light receiving elements for light amount monitoring, in a radial direction, arranged in a particular way. Yamamoto does not describe this arrangement.

Column 41, lines 45-50 of Yamamoto describe a range for the light receiving area 330 of a photodetector 324 with respect to the optical rotary encoder of Figure 38 of Yamamoto. More specifically, Yamamoto describes that area 330 as extending between minimum and maximum radii which are defined by particular mathematical formulas. The variables in these formulas are related to each other according to lines 38 and 39 in that column 41 of Yamamoto. From these mathematical interrelationships, it can be determined that first and second ends of the light receiving area 330, in a radial direction of Yamamoto's encoder, respectively correspond to first and second ends of a light distribution, in that radial direction, of light incident on the surface of the encoder head 302. Further, as described by Yamamoto in column 41, lines 53 and 54, the light receiving area 330 preferably extends beyond the described range. In other words, at least one of the first and second ends of the light receiving area 330, in the radial direction, extends beyond a width dimension, in the radial direction, of the distribution of the light incident of the surface of the encoder head 302. Thus, there can be no anticipation.

Another feature that Yamamoto does not disclose nor suggest, which distinguishes claims 4 and 7 from Yamamoto, is the location of the first and ends of the light receiving area 330, in the radial direction, within a width dimension, in the radial direction, of the distribution of light that is incident on the surface of encoder

head 302. It is, in fact, that arrangement that is described in claim 5 so that claim 5, independent of claim 1, cannot be anticipated by Yamamoto.

With respect to dependent claim 6, similar considerations, distinguishing from Yamamoto, to those already supplied also are applicable. Moreover, there is no description in Yamamoto, for example, for his encoder shown in Figure 38, that the light receiving area 330 of the photodetector 324 should be spaced at the interval specified at the end of claim 6 of the diffraction lattice pitch on the light receiving surface of the photodetector. Moreover, Figures 40-42 of Yamamoto, directed to rotary optical encoders, show that none of the pattern arrangements is determined by taking into account the diffraction lattice pitch on the light receiving surface. Accordingly, Yamamoto, independent of the rejection of claim 1, does not disclose or suggest features of claim 6.

Claim 7 distinguishes from Yamamoto and is allowable for the same reasons that claim 1 is allowable.

It is fundamental that, to anticipate a claim, a prior art publication must disclose every element of the claim. Since, as just described, numerous elements of the invention claimed in each of at least claims 1, 5, and 7, are not described or suggested by Yamamoto, those claims are clearly patentable over that publication.

Claims 9 and 10 are added to describe in greater detail one potential integer multiple relationship between the angular width of the light receiving elements for light amount monitoring and the angular interval of the light intensity distribution. This amendment is supported by the description in the patent application as filed, for example from page 11, line 19 through page 12, line 11, particularly when considered in combination with Figures 3(a) and 3(b), which are described in the cited passage. Referring to the latter figure, it is apparent that the slit having a generally trapezoidal shape for the light receiving element 23b has an angular width Wθ that is substantially larger than the angular width of a slit for the light receiving element 31 for rotation angle detection. Although there does not appear to be a suggestion in Yamamoto that

Figure 3(b) is drawn to scale, it appears that the slit width of the slit for the light receiving element for light amount monitoring in the depicted embodiment is three times the width of the slit for the light receiving element for rotation angle detection. It is, in any event, apparent that the slit widths can be different. It is also expressly described in the patent application that the slit widths have a multiple integer relationship to each other. That description, particularly when taken in combination with the figures supports the addition of claims 9 and 10.

Claims 9 and 10 further distinguish from Yamamoto for the same reasons already presented. Moreover, all optical encoder arrangements described by Yamamoto employ a plurality of slits and light receiving elements of uniform angular widths. Thus, there is no description or suggestion in Yamamoto that some of the light receiving elements should have angular widths that are integer multiples of the angular light intensity distribution produced by light passing through slits of the rotary slit plate, much less the angular width relationships of claims 9 and 10.

Upon reconsideration, claims 1 and 5-10 should be allowed.

Respectfully submitted,

Jeffrey A. Wyand, Reg. No. 29,458
LEYDIG, VOIT & MAYER
700 Thirteenth Street, N.W., Suite 300
Washington, DC 20005-3960
(202) 737-6770 (telephone)
(202) 737-6776 (facsimile)

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